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ABSTRACT

This report on the implementation of computer technology in Toronto elementary and secondary schools was based on an analysis of current implementation compared to what had been envisioned for the system in 1985. The following impediments to implementation were noted: (1) financial constraints due to a lack of provincial operating funds; (2) hardware demands and the need to update and/or replace computers as they become obsolete in the changing technological market; (3) software--finding and selecting quality programs from the vast quantity available, and then integrating their use into the classroom; (4) a need for inservice teacher education and continuing teacher education to facilitate the use of computers and other innovative technologies; (5) a need for technical support staff who will set up the technology and ensure its continued operation; (6) a need for curriculum support staff who are familiar with new technology and can assist teachers with curriculum development; and (7) political realities, particularly as they pertain to the allocation of resources and equality of opportunity. It is concluded that new materials, new practices, and new beliefs must also be addressed in order to effect educational change. (DB)

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INTERNATIONAL CONFERENCE ON TECHNOLOGY AND EDUCATION
BRUSSELS - MARCH 20, 1990

"INTRODUCING NEW TECHNOLOGY: CHASING A DREAM"

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INTRODUCTION:

1. Opening comments; clarification on change of positions from Director of The Toronto Board of Education to Director of The Metropolitan Toronto School Board

2. Demographic data about -

   i) City of Toronto - 700,000 of 2.3 million within Metro; core of six municipalities making up Metropolitan Toronto multi-culturalism; inner-citiness

   ii) Toronto Board - 160 schools: 69,000 students; 4500 teachers; plus 250,000 adult and continuing education students; slowly declining enrolment, 1990 budget of $480 million

3. governing structure -

   i) Ontario Ministry - Metro Board - Toronto Board

   ii) Funding - 100% raised by a real estate tax levied uniformly across all of Metro

   iii) Local Board - very people-oriented; addresses social issues, for example, race relations, multi-culturalism, teacher aides in kindergarten, etc.

II **COMPUTERS ACROSS THE CURRICULUM**

While my remarks today are entitled "Introducing New Technology: Chasing a Dream". I do not plan to discuss the new technology itself, nor will I say much on the curricular role that the Toronto Board sees for that technology since that

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topic would be a presentation of its own. What I do want to concentrate on are implementation issues related to the new technology, as seen from my perspective as Chief Executive Officer of a large metropolitan Board of Education.

We are assured by psychologists that nocturnal dreams are not only natural, but are also important to our psychological health. I also believe that it is equally important for each of us to have "day" dreams. But, these should be termed "visions". Our country, our city and our local school board have made incredible developments as a result of visions believed in and promoted by various individuals. I believe that in my tenure with the Toronto Board some of my visions have contributed to its positive development.

You are here today because you share a common vision, namely that a tool that is less than half a century old can and will make significant contributions to, and a possible restructuring of, our system of education. I applaud your initiatives and urge you to pursue your personal visions.

Many, and perhaps all of us, have some recurring nighttime dreams. Some may not be pleasant and we regret their re-appearance. Others may be satisfying, and we wish that there was a menu on a computer screen to which we could point and re-activate the dream at will. Alas, the new technology has not yet evolved to that state; and we are left "chasing these dreams".

Similarly, there is no magical formula that allows us to put into place the daytime visions that we hold. Unlike our dreams that function in the sub-conscious, we are able to develop implementation strategies for our visions and take conscious steps towards their adoption. But, for most visions, the pathway towards implementation is far from straight and is fraught with perils. I am sure that you already know this to be true for your vision.

In 1985 the Toronto Board adopted a report entitled Learning With Computers: The Next Few Years The first 44 pages of this report struggled with a vision; the next 30 pages outlined steps along a pathway of implementation.

Basically, the report viewed computer technology as:

- a tool that can enhance and extend student learning and assist all learners to develop to their full potential.

- a vehicle that can help develop in learners the skills and traits that will be required for graduates who enter the 21st century.

- a means to improve equality of educational opportunity amongst learners.

III FORCES THAT IMPEDE IMPLEMENTATION

In the Spring of this past year a review was conducted in the Board to determine the state of implementation of computers across the curriculum compared to what had been envisioned for the system in 1985. The results indicated that, while much had been accomplished, implementation was slower and more uneven than had been originally anticipated.

What were the forces that impeded implementation of our vision? I will focus on seven issues:

1. Financial Constraints

My opening remarks indicated that demands on public funds at the provincial level and a very strong local tax base have resulted in a situation where there will be absolutely no provincial operating funding support for the Board in 1990. The introduction of new technology that offers no foreseeable financial payback, regardless of hoped for curricular benefits, must fight amongst a multitude of competing priorities for its share of a limited financial pot. The "expense" theme which is a reality of public life, will re-appear in the discussion of several of the other restraining forces.

2. Hardware Demands

After spending significant sums from 1981 to 1989 the board has reached the state of having approximately 3,100 microcomputers in elementary schools and 2,200 units in highschools. These numbers are well short of what is currently viewed in Ontario as the desirable plateau, namely one computer for every ten students - 5,300 units actual versus 6,900 units desirable. But some would say that the situation is much worse than these statistics suggest. If one accepts that microelectronic technology is out-of-date in 3 years and obsolescent in 5, then advanced students could well be interacting with dated and/or obsolescent technology. I would hesitate to ask what label is affixed to those Commodore, Apple and Acorn computers that are 7, 8 or even (dare I say it?) 9 or 10 years old. In other words, before reaching a minimum desirable quantity the board is faced with a huge and frightening replacement requirement.

Unless, and it's a big unless, the Board is prepared to accept the curricular point of view that says beginning students can learn their basic skills, e.g. keyboarding, on machines that would otherwise be viewed as obsolete. If this point of view is accepted and there's still no definitive decision, then this "huge" problem would become merely a "very expensive" one!

Ontario has recognized the value of networking classroom computers together to facilitate the sharing of resources and communication between people - within the school and to the world at large. Central purchases over the past 5 years have focussed on the acquisition of networked systems for Apple, IBM and Unisys. In addition to a large up-front purchase price for such sophisticated systems, there have been major additional outlays to ensure adequate electrical power in each classroom and to run network cabling throughout older school buildings - some of which have celebrated their centennial and were constructed before the time of false ceilings. For some of these schools, electrical/cabling costs average more than $1,700 per classroom!

And it seems that the arrival of a microcomputer into the classroom is a signal for a rush of other hardware related requests: hard disk drive, laser printer, modem (and of course a telephone line), fax machine (we'll use the same telephone line), videodisk ... and the list goes on! The potential costs are prohibitive.

3. Software Concerns

As an educational community we can usually reach agreement on what constitutes quality in print materials. That is the most familiar medium for most of our teachers. Software, however, is a brand new medium, and discord seems to prevail on what is a good, and what is a bad, computer program. There is concern that some software reaches the classroom because it is glossy, colorful, dynamic - not because it matches curricular goals.

There is also the problem of an overwhelming quantity of software titles with constant releases of new programs and the re-release (dramatically improved, of course) of existing products. Teachers are bombarded by advertisements and feel that their small group of "ancient two year old programs" is inadequate. "If only I had that software that I read about in _____" (substitute your favorite computer magazine here). Too much time is spent by teachers complaining in the "If only ..." mode rather than on implementing what they have!

Another disturbing aspect is the belief amongst too many teachers that when students are actively engaged at the computer with good software meaningful learning must be occurring. Some recent research in Ontario questions this assumption, regardless of how well the program has been designed. Teacher guidance and intervention are essential to ensure that curricular objectives are not being by-passed by students.

4. Teacher In-Service

In the early 1980's we simply gave a computer to one of the leading edge teachers and personal time was immediately found to learn its operation, or to take specialized courses, or ... whatever. We are now trying to assist the next wave of teachers, those who are less excited about the technology or even frightened of it. You can't just give technology to these teachers; you also have to give them school time to explore it, become comfortable with it, talk about it. To use school time requires employment of substitute teachers, and they are a very scarce and expensive commodity in Toronto. When we can obtain an occasional, we then face complaints over the disruption of the students' program - from students, parents and even the released teachers themselves.

If such release could be a one-time affair, it might be manageable. But, as new software is acquired and as other technologies become established the need for further in-service arises. No relief is in sight. This is disturbing both to administrators and to teachers who are already inundated with a wide variety of other initiatives.

5. Support Staff - Technical

It is important that the teacher, whose role is to focus on curriculum, has access to knowledgeable, technical support personnel who will set up the technology and do any needed trouble-shooting. In Boards that are in a period of declining enrolment, the employment of new, specialist technicians is likely a non-affordable luxury.

New, qualified staff can be hired only as attrition occurs. The result is that personnel within the existing support infrastructure must be retrained in order to provide teacher support. For some, this comes as a rejuvenation, and they soon can be found out in the field. For others, it is traumatic and they busy themselves with previous priorities to avoid their new roles.

Even with the former people much retraining time is needed. Union rules require compensation for out-of-hours in-service; or schools demand replacement personnel for any in-hours training. Both approaches are expensive.

Within the technical support group there must also be one or two key staff who do possess considerable expertise and who act as trainers and as support to the other personnel. Such highly qualified people are tempted by higher salaries in industry, and their loss creates disruption in the support mechanism.

6. Support Staff - Curriculum

The Board has a large cadre of consultative personnel who are specialists in the various subject fields and who assist teachers with the delivery of curriculum. The specialization experience for most of this staff was prior to the widespread diffusion of computers, and the new technology is a medium that is unknown, and often uncomfortable, for them. As with technical personnel, special training must be provided; and, as with the former group, reaction to the new technology is mixed. Even for those who are enthused about the new technology, it is not unusual to find little reference to this medium when they interact with teachers on curriculum delivery. Rather, they automatically gravitate to their classroom experiences and comfortably discuss the media of print, film and television. For those who remain uncomfortable about the new technology, direct calls to them for aid in identifying software, etc. are simply deflected.

7. Political Realities

Different interpretations apply to the term "equality of opportunity". Some argue that a massive influx of technology should be provided for students with special needs - whether physical, emotional or intellectual. They believe that this will finally allow such learners to have the opportunities that the "regular" student takes for granted. Political pressures, however, can intervene to argue that resources should be spread out equally amongst all students to ensure that none is denied the opportunity for computer-related experiences in preparation for the Information Age.

Similarly, equality of opportunity can become distorted when equal numbers of computers are distributed amongst schools on the basis of student population. The parents of higher socio-economic communities may be able to augment their school's allotment through fund raising events and/or donations from business contracts and thus destroy any planned equality.

Thus, equality as an espoused and admirable aim must face the reality of political and community pressures.

IV FINAL CONCERN

According to Michael Fullan of the University of Toronto, author of The Meaning of Educational Change, there are three elements that must be addressed with any educational innovation: new materials, new practices and new beliefs.

The concerns expressed earlier deal mainly with problems related to materials and practices. But, perhaps the greatest roadblock to the successful implementation of new technology to achieve the potential proclaimed by its supporters is the third element - the pedagogical principles that guide the teacher in her or his interactions with students. The educational system, which produced the majority of the board's current teachers (whose ages are in the 40s and 50s) did an excellent job of inculcating values and beliefs inherent to the industrial age. That educational system could not have foreseen a microelectronic revolution that would suddenly and dramatically, introduce what Toffler has described as the Third Wave - the information society. Many in the teaching profession have recognized the need for change in their classrooms in order to better prepare graduates for that new society. These teachers are re-examining their educational philosophy, and for them access to new technology raises the challenge - "How can I use these tools to CHANGE what I have been doing in the past?" For such individuals the investments suggested above do produce a payback - not financial, but in terms of a better preparation of the youth in their charge.

However, it seems that the pedagogical base for most teachers is still related to the industrial paradigm. For these individuals access to new technology too often means "How can I use these tools to CONTINUE to do what I have always done but do it better or as it is sometimes called, "Decorating the Status Quo"! For these individuals the investments described may be questionable.

Our greatest challenge then is not the acquisition of hardware, or the selection of software, or the demonstration to teachers of how to operate with these new materials. Rather, it is the motivation of teachers to acquire a vision of a future society which will demand from its members new knowledge, new skills and new characteristics, and a realization by teachers that current classroom practices must be re-examined to ensure this challenge is met. It is at this point of re-examination that access to the new technology becomes pertinent.

Only if teachers are seen to be pursuing such a vision will there be real motivation for a Board of Education to address the serious concerns outlined above.

As a CEO, I cannot and will not support a program that simply puts "new materials in old classrooms" My vision is to chase that dream, temper it with reality and help our teachers learn to use the power of the computer to enhance their professional competence. Only through this can our students be challenged with the vision of today in preparation for the reality of tomorrow.

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